FALL *and* SPRING
CANKERWORMS
in the prairie provinces

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Although this brochure contains the latest technical information available, application of the chemical recommendations is at the user's risk and subject to any law that may apply.

July, 1974

INTRODUCTION

Fall[1] and spring[2] cankerworms are native insect pests of North America. On the Canadian Prairies, the fall cankerworm generally causes the greatest damage because it is the most widespread, occurs more frequently, and in greater numbers. Infestations of the spring cankerworm do, however, develop occasionally in localized areas, and are capable of causing substantial damage. The larvae of these two insects, which resemble caterpillars and are often called loopers or spanworms, are found on the foliage in early spring shortly after the leaves appear. Both species may occur simultaneously on the same trees or as separate outbreaks in widely scattered localities.

Larvae of the fall cankerworm.

[1] *Alsophila pometaria* Harr.

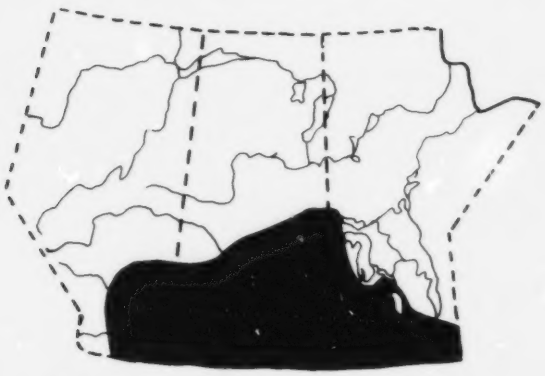
[2] *Paleacrita vernata* (Peck)

HISTORY OF INFESTATIONS

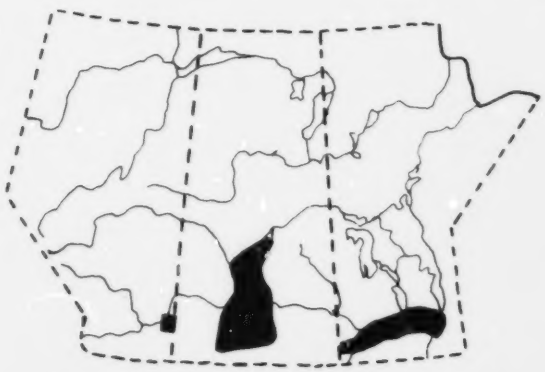
Occurrence of fall and spring cankerworm outbreaks in North America is well-documented. Infestations causing severe damage were reported in the United States as early as 1750. In Canada, infestations of either one or both species dating back more than one hundred years have been recorded throughout the range of the host trees from the Maritime Provinces to British Columbia.

In Manitoba, Saskatchewan and Alberta, cankerworm outbreaks became more prevalent after agricultural settlement, and as a result have had a significant impact on trees planted for farmstead and field shelterbelts, urban beautification, park development, and on native stands of host species. Since the mid-1930's, when annual insect surveys were initiated by the Canadian Forestry Service, persistent outbreaks have caused notable branch - and top-killing and some mortality of host trees throughout the Winnipeg-Emerson, Lyleton-Souris and Brandon areas of Manitoba; the Regina-Shaunavon, Swift Current-Kindersley and Saskatoon areas of Saskatchewan; and the Lethbridge-Medicine Hat area of Alberta. More recently (1970 -), severe defoliation has occurred in Winnipeg and many affected trees have shown signs of declining vigor.

Complete defoliation of Manitoba maple by the fall cankerworm.



Distribution of fall cankerworm, 1936-1973.



Distribution of spring cankerworm, 1936-1973.

HOST TREES

Cankerworm larvae feed on a variety of deciduous trees and shrubs. American elm and Manitoba maple are the preferred tree species, but basswood (linden), bur oak, white birch, Siberian elm, ash, and poplar also are commonly attacked in natural stands or in ornamental plantings. In addition, the larvae will feed on shrubs including apple, plum, cherry, lilac, honeysuckle and rose.

LIFE STAGES

Fall Cankerworm:

Egg - Brownish, tiny and flower-pot-like in shape. Laid in compact masses on the bark of the tree trunk and branches.

Larva - Full-grown larvae are about 1 inch (25 mm) long and vary from light green to brownish-green with a darker stripe down the back. Green larvae may have longitudinal white lines. The larvae have three pairs of ventral prolegs.

Pupa - Enclosed in tough cocoons, with particles of soil interwoven in with the silk.

Adult - Male moths have a wing spread of about 1.25 inches (30 mm). Forewings are brownish-grey with two irregular light bands and the hind wings greyish to light brown. Female moths are dark grey in color, wingless and without spines on the body.

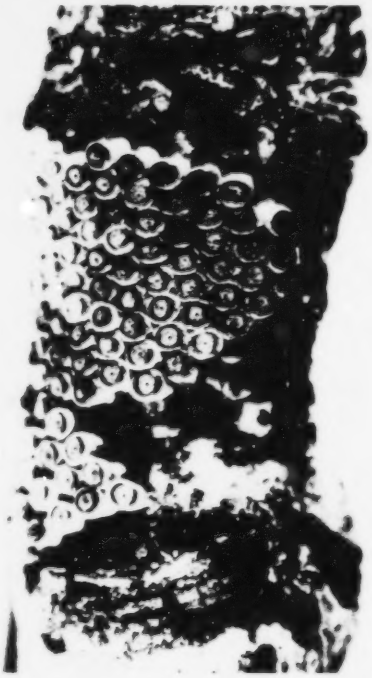
Spring Cankerworm:

Egg - Dull pearl and oval in shape. Laid in loose clusters in bark crevices or under bark scales on the trunk and branches of the trees.

Larva - Full grown larvae range from .75 to 1.25 inches (20 to 30 mm) and vary from yellowish-green to reddish or blackish. The body may be marked with uneven black lines or a yellow stripe on the sides. The larvae have two pairs of ventral prolegs.

Pupa - Enclosed in earthen cells in the soil; no cocoon is formed.

Adult - Male moths have a wing spread of about 1.5 inches (35 mm). Forewings are brownish - grey crossed with three dark lines and hind wings are pale grey. Female moths vary from brownish to blackish, are wingless, and have two transverse rows of reddish spines.



Eggs of the fall cankerworm

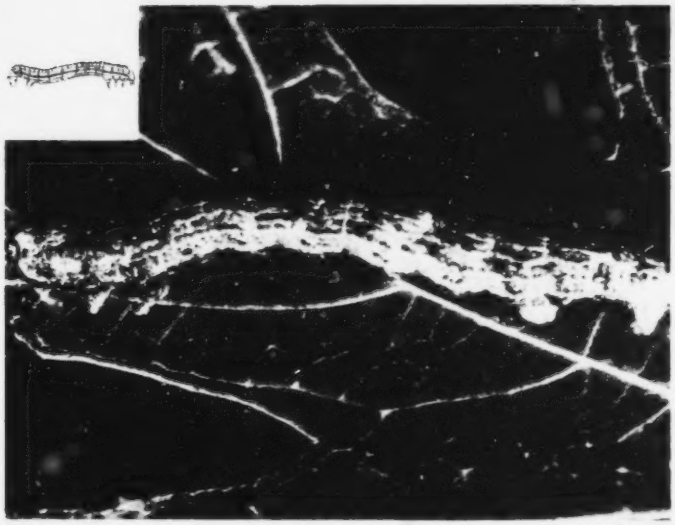
Pupae of the spring cankerworm

FALL CANKERWORM

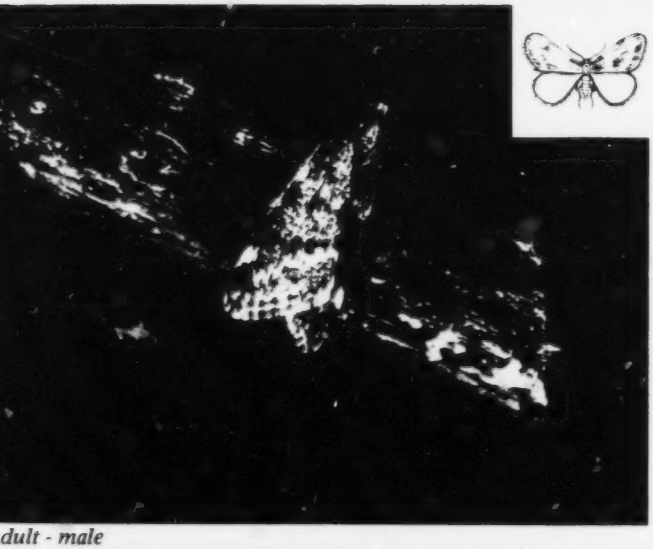
SPRING CANKERWORM

Courtesy GLFRC

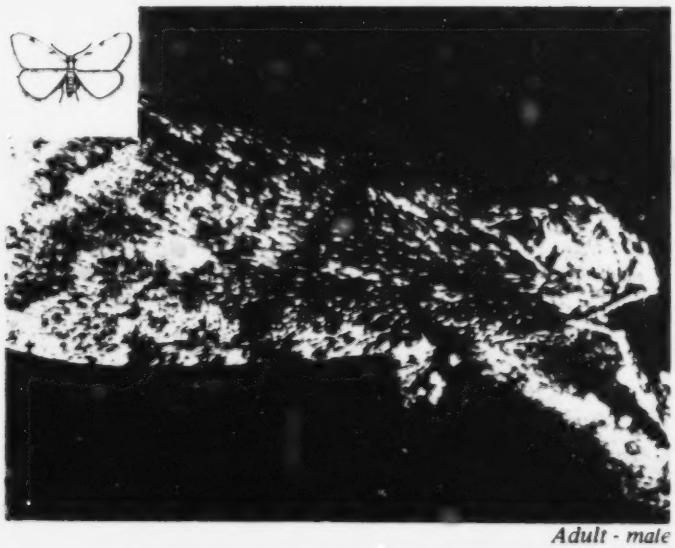
arva



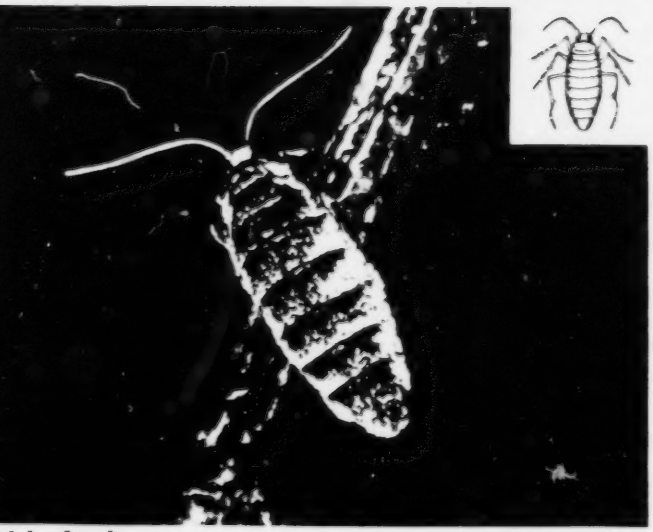
Larva



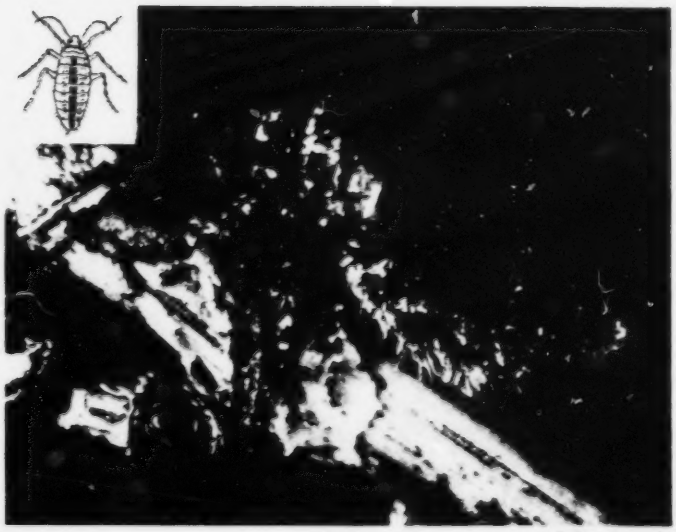
dult - male



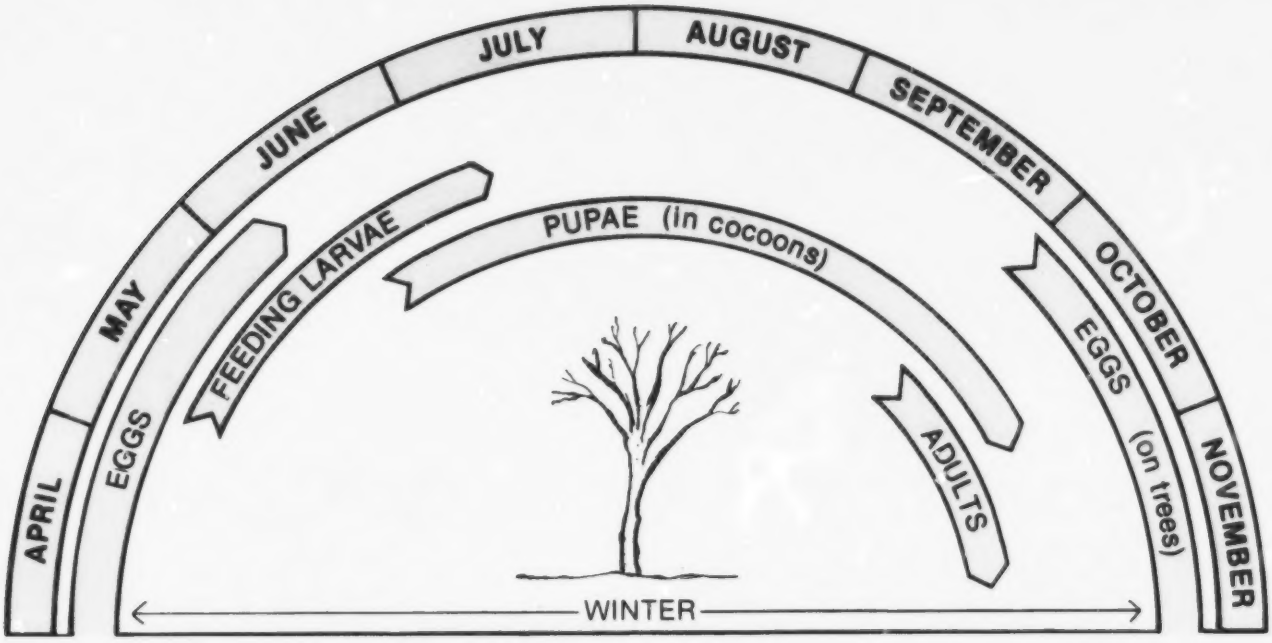
Adult - male



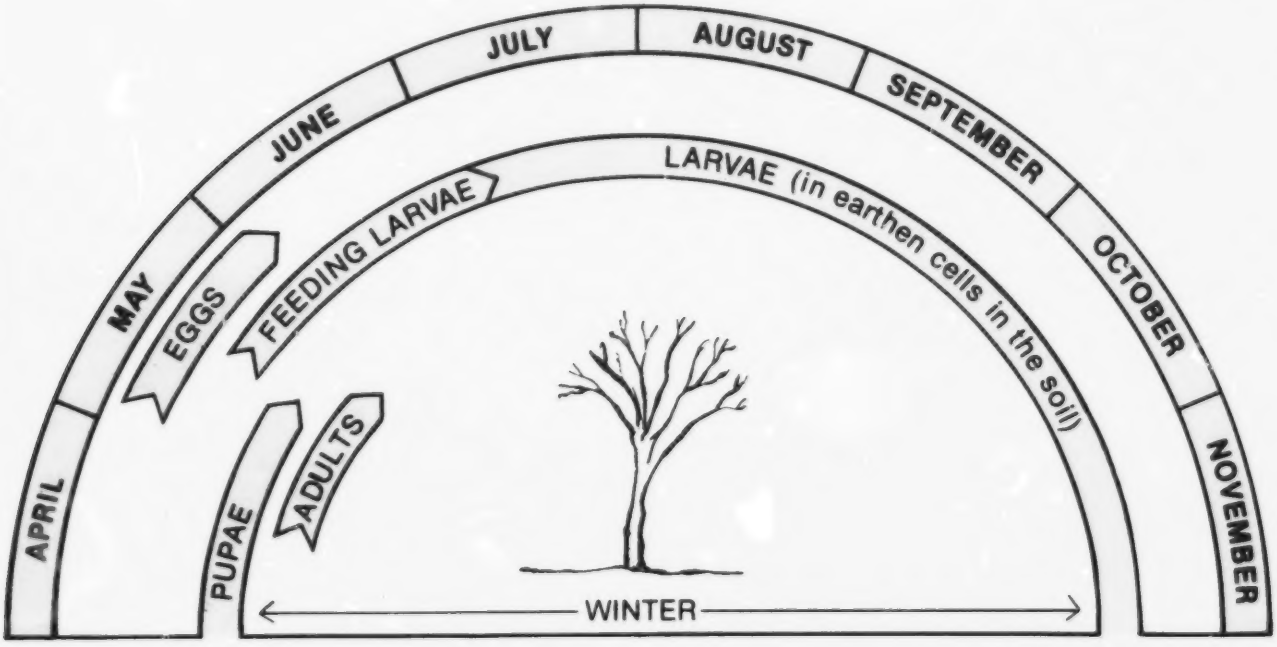
dult - female



Adult - female



Life history of the fall cankerworm.



Life history of the spring cankerworm.

LIFE HISTORY AND HABITS

In the Prairie Provinces, cankerworms have one generation each year. Since the females are wingless, they must crawl up the trunks of trees and shrubs to lay their eggs. In extremely heavy fall cankerworm infestations, eggs may be deposited on fence posts, fence rails and sides of buildings.

Under favorable conditions hatching commences in early May usually coinciding with spring bud development and continues through to about the first week of June. Larval feeding begins as soon as the leaves appear and is complete by the last week of June, but may extend into early July in cool, wet conditions. Larvae pass through five or six stages of growth (instars) during this 30 to 40 day feeding period. They spin silken webs while feeding, and if the infestation is severe the strands may become so numerous that they form sheets of loose webbing. This particular habit of web spinning allows the larva to drop from the foliage if disturbed, to escape predators and to lower itself to the ground when full-grown. It also aids in the dispersal of the insect from tree to tree and stand to stand since the silken threads and larvae, if torn loose, float readily on air currents. When full-grown the larvae drop from the foliage to the ground, burrow through the litter layer and spend the pupal period either in a cocoon (fall cankerworm) or an earthen cell in the soil (spring cankerworm).

Moths of the fall cankerworm emerge from the cocoon during late September and October, usually after the first severe autumn frost. Females mate with the males and egg laying starts soon after, continuing through autumn until winter weather sets in. The eggs remain on the trees through the winter and hatch the following spring. The larvae of the spring cankerworm remain in their earthen cells throughout the summer and autumn, change to pupae in late winter, and emerge as adults very early in the spring.

Defoliation of a Manitoba maple by the fall cankerworm.

INJURY

Cankerworms cause injury by defoliation. If young foliage is examined in early spring on the prairies, the tiny larvae will be found on the under surfaces of the leaves. The first noticeable sign of an infestation are small "shot holes" in the leaves. As the larvae continue to feed they enlarge the holes until eventually all leaf tissues except the principal veins are destroyed. In heavy outbreaks the leaves may be consumed as fast as they develop and by mid-June, when many of the larvae are mature, the entire tree may be completely stripped of foliage.

Healthy trees usually refoliate by mid-July, about three weeks after the larvae drop from the trees, and bury themselves in the ground. However, after three or more consecutive years of severe defoliation, affected trees develop many dead branches (dieback) in the upper part of the crown. Trees damaged to this extent soon loose their aesthetic values and may ultimately succumb to competition from adjacent trees and encroaching vegetation, or to attack by other insects and tree diseases. Sustained heavy defoliation also encourages some tree species, especially Manitoba maple, to produce a proliferation of suckering and epicormic branching on the trunk. These branches reduce tree vigor generally and, in stands, create a hazard to adjacent trees by overcrowding.

Shot holes.

Early skeletonizing

Progressive feeding by the fall and spring cankerworms

Advanced feeding.

Advanced skeletonizing

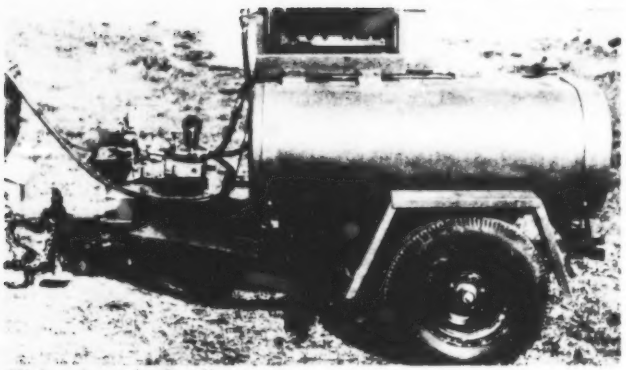
CONTROL

Cankerworms are vulnerable to many natural enemies and adverse weather conditions. Parasites and predacious insects are often numerous in persistent infestations, attacking both eggs and larvae. Several species of birds prey on the feeding larvae, and ground beetles, ants and rodents consume many after they drop to the soil to pupate. Late spring snowstorms, unseasonably cold rains and restricted food supplies, which induce starvation among developing larvae, also substantially reduce populations. These combined factors play a major role in regulating cankerworm abundance. However, in periods of heavy infestations they are less effective, and applied control measures are frequently required for shelterbelts, shade and ornamental trees.

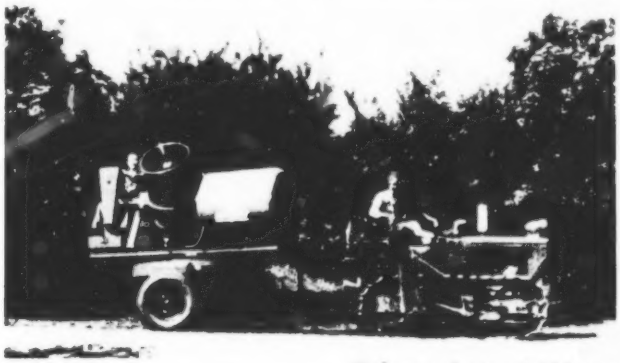
Chemical

Chemical control using insecticides is relatively simple. One application, if applied at the proper time, is sufficient to prevent serious defoliation. Spraying should be carried out in late May or early June as soon as the young larvae are noted on the under surfaces of the leaves or when "shot-hole" damage to the foliage is first observed. Carbaryl is a registered chemical insecticide for cankerworm control and may be applied with high-pressure sprayers equipped with hose and gun, mist-blowers and hand sprayers, or dusts and pressurized sprays when only small quantities of the spray are required. The microbial insecticide, **Bacillus thuringiensis** var **alesti**, is also effective in controlling cankerworm populations and can be applied with the various types of hydraulic spray equipment.

High-pressure sprayers depend on a large volume of water to carry the insecticide to the trees, and therefore sufficient spray mixture should be applied to wet the foliage thoroughly without run-off. Mist-blowers deliver a small quantity of spray mixture - but at a higher concentration - and the trees should be sprayed only to the point where the foliage begins to glisten.



High volume hydraulic sprayer



Low volume mist blower

The control achieved depends on careful spraying. It is very important that the insecticide reaches all foliar parts of the tree. Select the type of equipment most suitable for the job. High-pressure sprayers and mist-blowers are most practical for treating tall ornamental, boulevard or shelterbelt trees while hand-sprayers or aerosols are more suitable for treating small trees.

In forested and park areas where fairly large acreages require treatment, aerial application of insecticides is the most economical method. However, the decision to spray with aircraft must be based on surveys carried out to determine the risk of continued high larval population levels. For these large-scale control operations, permission to spray and approved insecticides, concentrations, and techniques must be obtained from regional government authorities.

Banding

The practice of banding trees with a sticky substance such as "Tree Tanglefoot" is based on the fact that females months are wingless and must crawl up the tree trunk to lay eggs. Although banding is generally less satisfactory than spraying, individual or groups of shade trees can be treated efficiently. A 4-inch wide band of glass wool insulation

Insecticide	Truck or Trailer Mounted Sprayers		Portable Knapsack Sprayers		Hand-Pumped
	High Pressure	Mist Blower	High Pressure	Mist Blower	
*Carbaryl (Sevin®)	1.0 lb./100 gallons water ***	4.0 lb/100 gallons water	0.5 oz./ gallon water	2.0 oz./ gallon water	0.5 oz/ gallon water
**_Bacillus thuringiensis_ var. _alesti_ (Dipel®)	0.5 lb/80 gallons water	5.0 lb/80 gallons water	---	---	---

*Rates given are active ingredient.
**Contains 7.26 billion International Units of potency per pound of product (equivalent to 16,000 I.U./mg.).
***1 lb. = 454 grams; 1 gallon = 4.54 litres.
Note: dusts, wettable powders and pressurized sprays containing carbaryl in various mixtures with endosulfan, malathion, rotenone and pyrethrins are available for home-owner use. Apply as directed on the manufacturer's label.

with paper backing is secured around the tree trunk about seven feet above the ground. A strip of cotton batting placed around the tree and then covered with a band of building or tar paper can also be used. After installing the bands, a thin layer of "Tree Tanglefoot" is smeared over the paper. Any difficulties in properly installing bands caused by rough bark on older trees may be overcome by carefully removing the loose bark scales.

Cankerworms emerge from the ground both in the fall and spring. Therefore, bands should be installed during early September to protect trees from the fall cankerworm and re-treated with tanglefoot immediately after the first spring thaw for protection against the spring cankerworm. To maintain their effectiveness, the bands must be kept free of debris such as leaves, entrapped insects or dust, otherwise the band will be bridged enabling the females to ascend the tree to lay their eggs.

Courtesy City of Winnipeg

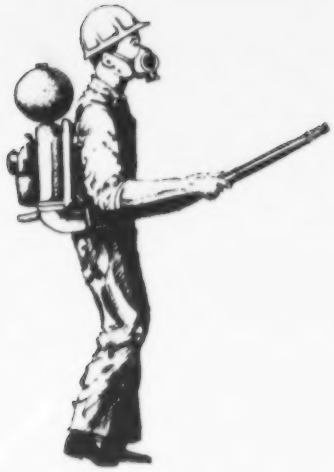
Applying tree tanglefoot to the band. ▲ ▲

A properly installed band. ▲

TAKE TIME

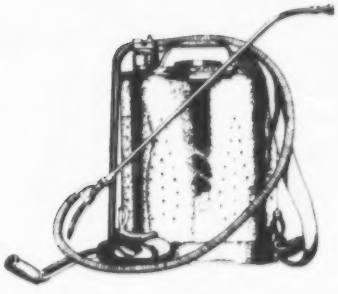
OBSERVE LABEL DIRECTIONS

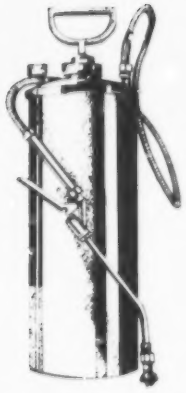
Carbaryl is poisonous to man and other animals. Always read and carefully follow the directions and safety precautions on the manufacturer's label.

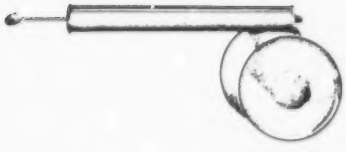


Portable mist blower.

Aerosol sprayer.







Small hydraulic sprayers.

SELECTED READING

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Additional information or copies of this report may be obtained from:

Northern Forest Research Centre
Canadian Forestry Service
Environment Canada
5320 - 122 Street
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